



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

It is worthy of note in this connection, that there are various other fossils in the upper members of our lower Carboniferous series that might with quite as much propriety be referred to European Permian species as many of the Western Coal-measure types that have been so referred. For instance, Dr. Prout long since (Trans. St. Louis Acad. Sciences, vol. I. p. 450) identified a *Polypora*, from the Chester beds, with the Russian Permian *P. biarmica*; while several other species of *Polyzoa* found in the Chester group are scarcely distinguishable from forms found in western beds that have been by some included in the Permian. We also now know that there are species of *Schizodus*, *Pleurophorus*, etc., in the Chester beds very like Permian forms; while a Crinoid, found by Prof. Marcou in beds in Nebraska (referred by him to the Permian), and thought by him to be "extremely near *Encrinurus moniliformis*, Miller, of the Muschelkalk of Europe," is now known to range through the whole of the Western Coal-measures, and to be represented in the Chester limestone beneath the Millstone-grit by closely allied species. Indeed, a number of Crinoids that have been recently discovered in the Chester beds and the Coal-measures of Illinois are remarkably similar representative forms. Even the curious *Zeacrinus mucrospinus* of McChesney, from the Upper Coal-measures of Illinois, has its nearly allied representative in the Chester limestone below the Millstone-grit.

Numerous facts like the foregoing (such, for instance, as the occurrence of Tertiary types of plants in the Nebraska Cretaceous), might be cited to show that in many instances particular forms of life, both animal and vegetable, appeared here at earlier periods than in the old world. Hence, great caution, and some general knowledge of the entire fauna and flora of our rocks, are often required in order to arrive at sound conclusion with regard to their relations to particular horizons of the series, as made out in Europe.

April 5th.

DR. CARSON, Vice-President, in the Chair.

Twenty-three members present.

PROFESSOR LEIDY made the following remarks ON DISCOSAURUS AND ITS ALLIES.

The body of the last vertebra in the series of caudals belonging to the Kansas saurian, described by Prof. Cope under the name of *Elasmosaurus*, has the length less than the depth or breadth, which latter is the greatest diameter. It is moderately contracted towards the middle, the sides below the neural arch and the surface below the costal articulations being fore and aft concave, and bounded in front and behind by an acute margin from the articular ends. A ridge extends fore and aft between the chevron articulations and the included surface is concave, and exhibits a single lateral venous foramen. The costal articular processes project from the middle of the side of the body, reaching nearer the fore than the back end of the latter. They are transversely oval, about three-fourths the length of the body, and the height about half. They form a deep concavity, with acute margins expanding peripherally. The articular ends of the body are transversely oval and defined from the intermediate portion of the latter by an acute everted margin. A short distance within the position of the latter the surface is marked by a narrow groove, and within the circle of this groove the surface projects in such a manner as to appear like a distinct disk or epiphysial plate applied to and coössified with the body. The surface of the disk is convex at the periphery and moderately concave towards the centre. The articular surface beyond the groove defining the disk appears as an everted ledge, and the triangular articular facets for the chevrons appear as deflections of the ledge. The extension of the latter inferiorly is greater at the posterior extremity of the body than

[April,

at the anterior extremity, thus producing a larger provision of surface in that position for the articulation of the chevron. The neural arch in the specimen has apparently been so much laterally compressed, that its original condition cannot be ascertained.

It was upon several similar isolated vertebræ to the one just described that the genus *Discosaurus* was established, and I shall now proceed to examine them comparatively with the object of determining their relationship with the Kansas saurian.

The genus *Discosaurus* was originally indicated from a mutilated body of a caudal vertebra from the cretaceous formation of Alabama (Proc. Acad. Nat. Sci. 1851, 326). In its imperfect condition, its peculiar character, and resemblance to a vertebra represented, by Prof. Owen, as a cervical of *Plesiosaurus pachyomus* (British Fossil Reptiles, pl. 28,) it was mistaken for a cervical. The specimen, together with another from the same individual, were described in their true position, as relates to the regions of the vertebral column, in the "Cretaceous Reptiles of the United States." They are represented in figs. 4, 5, 6, pl. v, of that work. The two vertebral bodies bear a near resemblance with that of the Kansas saurian above described. They have nearly the same proportions, and are slightly smaller and rather less contracted intermediately. The interchevron ridges are comparatively less well developed. The discoid arrangement of the articular ends is even more conspicuous. The disks are more prominent, more decidedly defined from the ledge beyond by a deeper constriction or groove. The periphery of the disks is rather more convex, and the surface towards the centre slightly less concave. The outside ledge is comparatively narrow and is not everted. The chevron articular surfaces appear rather to be produced through deflections of the groove defining the disk, than by an extension of the ledge, so that the chevrons would appear to have articulated with the depressed margin of the disk itself instead of with the ledge. The neural arch is broken away in both specimens, except part of an abutment in one of them.

The slight difference in size of these vertebræ from that of the Kansas saurian, as well as the feebler production of the interchevron ridges, might readily be due to their more posterior position in the column. The more decided constriction of the disks at the articular extremities from the rest of the body, which led to the application of the name of *Discosaurus*, might be regarded as an individual peculiarity, or a variation in specific character; which is often greater than real specific or even generic characters.

A similar vertebra, from the lower cretaceous of Mississippi, represented in figs. 10—12, pl. v of the "Cretaceous Reptiles of the United States," likewise referred to *Discosaurus*, has the same size and proportions as that above described of the Kansas saurian. In its anatomical characters it is intermediate to the latter, and those of the Alabama saurian. The interchevron ridges are intermediate in degree of development. The most marked difference exists at the articular ends of the body. The articular surface is comparatively flat, being but feebly depressed towards the centre and as feebly rounded towards the periphery, which extends to the acute margin defining it from the sides of the body, almost without the intervention of a groove such as is described in the preceding specimens. A slight deflection in the course of the acute border defines the anterior chevron articulation. The posterior chevron articulation is comparatively large and more distinctly defined than the corresponding one in the Kansas and Alabama specimens. The sides of the neural arch ascend in a steep slope from the more concave sides of the body, sweeping outwardly to the upper border of the costal pit. The diameter of the spinal canal is about seven lines.

Another vertebral body, from the cretaceous formation of New Jersey, referred to *Discosaurus*, is represented in figs. 7—9 of the work above indicated. It presents characters in common with the preceding specimens, but likewise has peculiarities of a decided kind. It approaches most the Alabama speci-

mens, and has nearly the same size. Interchevron ridges are entirely obsolete. The articular extremities of the body are very like those of the Alabama specimens, but the groove defining them from the acute margin is very inconspicuous or nearly obsolete. The deflections of the acute margin for the accommodation of chevrons are comparatively and remarkably deep, especially those anteriorly. The spinal canal at the orifices is about seven lines wide; at the middle scarcely five lines.

In all the specimens above indicated, a single venous foramen is situated on the under side of the body, to the right of the median line.

Comparative measurements of the specimens are as follow :

	Caudal from	Kansas,	Mississippi,	Alabama,	New Jersey.
Length of body inferiorly.....	24½ l.	24½ l.	23½ l.	23½ l.	
Breadth ant. artic surface.....	36	36	33½	34	
Depth “ “ “	30	30	26½	27½	
Breadth post. “ “ “	34	34	31	31½	
Depth “ “ “	29	29	—	26	
Breadth costal artic. cavity.....	18	17	15	15	
Depth “ “ “	12	11	11	11	
Width between inf. margins of costal cavities... ..	39	39	38	38	
Distance fore and aft of chev- ron surfaces.....	16	16	16	12½	

We thus have the nearly corresponding caudal vertebræ of four individuals, from the cretaceous formation of as many different localities, agreeing nearly in size, proportions, form, and construction, but exhibiting decided peculiarities in every case. Are these peculiarities to be considered of generic and specific value; of specific value alone; or are they to be regarded as variations in the characters of a single species? From the specimens alone I would incline to view them in the latter light, though I admit that each variation may represent a different genus, or a different species of the same genus. The reason for referring any one to a genus is equally good for all. If the Alabama specimens be regarded as characteristic of *Discosaurus*, and the Kansas one of *Elasmosaurus*, the caudal from Mississippi, with its nearly flat ends, is quite as characteristic of a third genus, and the New Jersey caudal, with its peculiarities, would form a fourth. The close correspondence in size of the specimens rather favors the view that they all pertain to the same species, though this may be as coincidental as the discovery of the nearly corresponding vertebra in the four cases. The one which, in my view, is most distinctive from the others, is the specimen from Mississippi, with the nearly flat articular extremities of its body. It may be well to consider it as representing a species, and for this one I propose the name of *Discosaurus planior*.

A vertebra, which accompanied the Discosauroid caudal from New Jersey, from its appearance was supposed to belong to the same individual. It was regarded as a posterior cervical, and is represented in figs. 1-3, pl. v, and described on page 24 of the "Cretaceous Reptiles." It would appear by comparison rather to be an anterior caudal, and so far as I can judge in the imperfect condition of the specimens, resembles most nearly the fifth of the last continuous series of twenty-two vertebræ of the Kansas skeleton. It appears to agree nearly in form, constitution, and proportions with the corresponding bone of the latter, but is rather smaller.

Some years since I had the opportunity of inspecting some vertebral specimens of a huge saurian in the possession of Mr. W. F. Roberts, who obtained them from near Greenville, Clark Co., Arkansas. They are supposed to be of cretaceous age, as the formation of that period is the prevailing one in the locality in which they were found. Two of the best preserved of the specimens, generally very imperfect, were briefly noticed in the Proceedings for 1854, page 72, and represented in figs. 1-3, pl. ii. The remains were observed

[April,

to bear a resemblance to those of *Cimoliasaurus*, and were referred to an animal with the name of *Brimosaurus grandis*. Through comparison with the skeleton of the Kansas saurian, they appear to be posterior cervicals, and further appear sufficiently near in character to belong to the same, though their larger size renders it probable that they pertained to a larger species.

A question arises as to the relationship of those remains originally referred to *Cimoliasaurus* with *Discosaurus* in the present state of our knowledge of the latter. In the first place, by comparison with the skeleton of the Kansas saurian, we observe that the position in the column, assigned to the vertebral bodies of *Cimoliasaurus*, was incorrect, and this probably contributed to mislead Prof. Cope in his examination of the skeleton of the Kansas saurian.

The vertebral specimens referred to *Cimoliasaurus* consisted of two sets of specimens, from two different individuals, both from the green sand of Burlington Co., N. J. They are described in "Cretaceous Reptiles," page 25, and characteristic ones represented in plates v. and vi.

The eleven vertebræ considered as lumbar, and represented by figs. 17-19, pl. v, and 16-18, pl. vi, are evidently cervicals. Those considered as dorsals on page 26, and represented in figs. 13-16, pl. v, are at least in part posterior cervicals. Of the fourteen vertebræ referred to on page 27 as dorsals and lumbar, those described and represented in figs. 1-5, pl. vi, are alone dorsals, while the others described and represented in figs. 6-9 are posterior, and those of figs. 10-18 more anterior cervicals.

The cervicals of *Cimoliasaurus* are so different in their proportions from those of the Kansas saurian that there can be no question as to the distinction of the two animals, at least as species.

Do all the remains originally referred to *Discosaurus* belong to this genus as distinct from *Cimoliasaurus*? I suspect that those from New Jersey belong to the latter. The animals indicated by all the fossils which have been under consideration are Plesiosauroid, and as in recognized species of *Plesiosaurus* there is much variability in the number, proportions, and other characters of the cervicals without a corresponding extent of variation in other parts of the vertebral column, we would be prepared to find in *Cimoliasaurus* nearly the same kind of caudals as in *Discosaurus*.

Prof. Cope, in his "Synopsis of the Ext. Batrachia and Reptilia," pt. i, 1869, p. 56, describes two vertebral specimens from the lower bed of the cretaceous green sand of Gloucester and Monmouth counties, which he attributes to a species with the name of *Elasmosaurus orientalis*. The specimens described as caudals are seen, by comparison with the Kansas skeleton, to be cervicals.

The smaller of the two specimens is intermediate in its form, proportions, and size with what appear to be the nearly corresponding vertebræ of the Kansas saurian, and the vertebræ referred to *Cimoliasaurus*. The larger specimen I have not seen, but from the description and measurements given it would appear to have belonged to a species quite as large as the Kansas saurian. The comparative measurements of the two specimens with that of the Kansas saurian, which appears to be most like them, and with the largest of the specimens which had been referred to *Cimoliasaurus*, are as follow:

	New Jersey specimens.		Kansas sp.	Cimoliasaurus.
Length of body.....	3 $\frac{3}{4}$ in.	4 $\frac{1}{2}$ in.	4 $\frac{1}{4}$ in.	3 in. 11 l.
Breadth "	4 $\frac{1}{2}$ in.	5 $\frac{3}{4}$ in.	4 $\frac{1}{2}$ in.	4 in. 2 l.
Depth "	3 in.	4 $\frac{1}{4}$ in.	3 $\frac{1}{2}$ in.	3 $\frac{1}{4}$ in.

The various remains to which I have referred in this communication probably indicate a number of different species of a genus, presenting a like variability in the number and proportions of the cervicals as has been observed in the closely related genus *Plesiosaurus*. In the present condition of knowledge of the remains, they appear to me to be referable to a series of species as follow:

1. *DISCOSAURUS VETUSTUS*.

Leidy: Pr. Ac. Nat. Sc. 1851, 326; Cret. Rept. United States, 1865, 22, 1870.]

- Cimoliasaurus magnus*. Cope: Pr. Bost. Soc. Nat. Hist. 1869, 266.
Cimoliasaurus vetustus. Cope: Synopsis Ext. Bat. Rept., &c., 1869, 57.
 Cretaceous of Alabama.
2. DISCOSAURUS GRANDIS.
Brimosaurus grandis. Leidy: Pr. Ac. Nat. Sc. 1854, 72, pl. i, figs. 1-3.
Cimoliasaurus grandis. Cope: Pr. Bost. Soc. Nat. Hist. 1869, 266; Synopsis
 Ext. Batrachia, Reptilia, &c. 1869, 57.
 Cretaceous of Arkansas.
3. DISCOSAURUS CARINATUS.
Elasmosaurus platyurus and *Discosaurus carinatus*. Cope: LeConte's Notes
 on the Geology &c. Union Pacific Railway, 1868, 68.
Elasmosaurus platyurus. Cope: Pr. Ac. Nat. Sc. 1868, 92; Pr. Bost. Soc.
 Nat. Hist. 1869, 266; Synopsis Ext. Batr. Rept. 1869, 46.
 Cretaceous of Kansas.
4. DISCOSAURUS MAGNUS.
Cimoliasaurus magnus. Leidy: Pr. Ac. Nat. Sc. 1851, 325; 1854, 72, pl. ii,
 figs. 4-6; Cret. Rept. U. S. 1865, 25, pl. v, figs. 13-19, pl. vi. Cope:
 Pr. Bost. Soc. Nat. Hist. 1869, 266; Synopsis Ext. Batr. Rept. 1869, 57.
Discosaurus vetustus in part? Leidy: Cret. Rept. U. S. 1865, 24, pl. v, figs.
 1-3, 7-9.
 Cretaceous of New Jersey.
5. DISCOSAURUS PLANIOR.
Discosaurus vetustus in part. Leidy: Cret. Rept. U. S. 1865, 23, pl. v, figs.
 10-12.
 Lower cretaceous of Mississippi.
6. DISCOSAURUS ORIENTALIS.
Elasmosaurus orientalis. Cope: Pr. Bost. Soc. Nat. Hist. 1869, 266; Synop-
 sis Ext. Batr. Rept. 1869, 54.
 Lower cretaceous of New Jersey.

In the cervicals of *Discosaurus*, so far as can be ascertained by the material at command, there appears to be no subdivision of the articular process for the riblets, as in *Plesiosaurus*. In the latter the chevron bones consist of lateral halves, ununited by osseous tissue. In the skeleton of the Kansas saurian, intervening between two of the caudals, there is a bone which looks as if it might be an inverted Y-shaped chevron, with one arm broken off. The spine broken at the end is about four inches long. The remaining arm, broken away at the articular end, is about three inches long.

On favorable report of the Committees, the following papers were ordered to be printed:

Descriptions of new Species and Genera of Fossils from the Palæozoic rocks of the Western States.

BY F. B. MEEK AND A. H. WORTHEN,

Of the Illinois State Geological Survey.

FORAMINIFERA ?

RECEPTACULITES FORMOSUS, M. and W.

Body obovate, the breadth being about three-fourths the height, and the widest point a little above the middle; upper end rounded, and without any umbilicoid concavity or opening, unless it may be a very small one; sides gradually tapering with a slight convexity from a little above the middle, to an apparently moderate sized base of attachment. Cell openings or depres-

[April,